REMARKS

Background

An Office Action dated July 29, 2004 was issued in the above-identified application. Claims 1-27 were in the application. In the office Action, all of the claims were rejected, and the drawings were objected to as being informal.

By way of the present Amendment, claims 1, 5, 9, 11, 15, 20 and 24 have been amended, and claims 4, 14 and 23 have been cancelled without prejudice. Accordingly, claims 1-3, 5-13, 15-22 and 24-27 are presently in the application. Claims 1, 9 and 11 are independent.

Objection to the Drawings

In the Office Action, the drawings were objected to for being informal.

Applicants have submitted, together with this Amendment, three sheets of Formal Drawings including figures 1-4. No amendments have been made to the drawings.

Accordingly, applicants respectfully request that the objections to the drawings be withdrawn.

Rejections Under 35 USC § 102

Before turning to the specific rejections of the claims, applicants would like to take this opportunity to briefly describe the claimed invention in general terms. Applicants' claimed invention is a self contained differential pressure sensor that may be connected to a variety of apparatuses and/or devices to measure the differential pressure of a fluid, such as air, passing through the apparatus or device. The claimed self contained differential pressure sensor has a flexible input hose and a flexible output hose that allow the self contained differential pressure sensor to be selectively attached to an apparatus or device so that a differential pressure may be measured. The flexible input hose and the flexible output hose can each be coupled to the

apparatus or device to be measured. The flexibility of the hoses facilitates satisfactory coupling of the self contained pressure sensor to the apparatus or device..

As described in the Specification, applicants' claimed invention advantageously calculates a differential pressure using a flow-based equation whereby a first thermistor measures a temperature of the fluid, while a second thermistor is kept at a constant temperature. A benefit of this method of measuring the differential pressure is that accurate results, independent of certain fluctuations in component responses, may be achieved. This method of measuring differential pressure has a potential down side, however, in that the fluid impedance characteristics of the flexible input hose and the flexible output hose must be taken into consideration as part of the pressure calculations. Accordingly, with the claimed invention, the fluid impedance characteristics of the flexible input and output hoses are advantageously measured and stored in a memory of the pressure sensor.

Thus, the claimed self contained differential pressure sensor has a flexible input hose and a flexible output hose that facilitate coupling the pressure sensor to an apparatus or device through which fluid flows, so that a differential pressure can be calculated. Further, to facilitate the advantageous flow-based method by which the claimed pressure sensor calculates the differential pressure, the fluid impedance characteristics of the flexible input tube and the flexible output tube affect the differential pressure calculations, and thus the fluid impedance characteristics of the flexible input hose and the flexible output hose are pre-determined and stored in a memory of the pressure sensor. Further, each of independent claims 1, 9 and 11, as amended, recites in the <u>body</u> of the claim the determination or output of a differential pressure.

Because none of the cited references describe a self contained differential pressure sensor for selective coupling to an apparatus or device, none of the cited references describe or provide

motivation for the claimed pressure sensor having a flexible input hose and a flexible output hose. Further, because none of the cited references describe a flow-based method of calculating a differential pressure, none of the cited references describe a calculation which requires the calculation of a fluid impedance characteristic of a flexible hose, and thus, none of the cited references describe or provide motivation for a system wherein the fluid impedance characteristic of a flexible hose, or any type of hose, would need be calculated and stored in a memory of a sensor, as claimed by the present application.

Applicants now turn to the specific rejections under 35 USC § 102.

<u>Alvesteffer</u>

In the Office Action, claims 1-8 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,125,695 to Alvesteffer et al. ("Alvesteffer").

Alvesteffer does <u>not</u> describe a differential pressure sensor. Alvesteffer is directed to a flow meter including a sensor tube with two heaters that are kept at a constant temperature above the ambient temperature. *See* Alvesteffer at Abstract. As fluid flows through the sensor tube, power is supplied to the heaters to maintain their constant temperature. *See* Alvesteffer at Abstract. Using the difference of the power supplied to the first heater and the power supplied to the second heater, a known constant for the fluid, and other measurements, the mass air flow is determined. *See* Alvesteffer at col. 5, ln. 49 to col. 7, ln. 17.

Applicants respectfully submit that, claim 1, of the present application, as amended, is patentable over Alvesteffer because Alvesteffer does not disclose each and every element of claim 1. *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

First, claim 1 is directed to a differential pressure sensor. Claim 1 recites, in the body of the claim, a microcontroller coupled to said fluid flow detector and said memory, said microcontroller being configured to determine a differential pressure value based on said level and on said characteristic. In stark contrast, Alvesteffer describes a flow sensor, and does not describe a differential pressure sensor. Accordingly, applicants respectfully submit that claim 1 of the present application, which recites a differential pressure sensor, is patentable over Alvesteffer for this reason.

Further, claim 1, as amended, of the present application, recites a fluid channeling device having a fluid channel defined therethrough and a fluid flow detector located in said fluid channel, said fluid channeling device further having a flexible input hose, a flexible output hose, and a fluid container having an input aperture to which said flexible input hose is coupled and an output aperture to which said flexible output hose is coupled.

Alvesteffer does not describe a fluid channeling device having a flexible input hose and a flexible output hose. Because Alvesteffer is not directed to a self contained pressure sensor that could be coupled to a separate apparatus, Alvesteffer is not concerned with and does not require or describe the claimed flexible input hose and flexible output hose.

The Examiner posits that Fig. 7 of Alvesteffer shows an input hose and an output hose, but applicants respectfully disagree. Fig. 7 illustrates a fluid flow system that is in series with the flow passage. Therefore, the measuring module of Alvesteffer is located inside the main flow passage, and nothing is used to connect the flow meter to the main flow passage. Indeed, with such an arrangement, not flexible hose is needed. In fact, the inline configuration of Alvesteffer actually teaches away from the use of a flexible hose. Accordingly, Alvesteffer does not mention hoses in the description of Fig. 7. In addition, other described embodiments of the

Alvesteffer flow meter also do not mention the claimed hoses. Fig. 2 of Alvesteffer illustrates a flow meter coupled in parallel to the main flow passage, but this flow meter embodiment also does not illustrate flexible hoses. Instead, the sensor tube, which is made of rigid steel, (*see* Alvesteffer at col. 4, lns. 15-19), is coupled directly into the main flow passage. The description of the Alvesteffer flow meter illustrated in Fig. 2 does not mention flexible hoses. *See* Alvesteffer at col. 4, ln. 9 to col. 7, ln. 17. In turn, since the flow meter of Alvesteffer does not include flexible hoses, the flow meter of Alvesteffer cannot and does not include an input aperture for coupling a flexible input hose, nor an output aperture for coupling a flexible output hose.

Further, claim 1, as amended, of the present application, recites, *inter alia*, memory having stored therein a characteristic of said fluid channeling device, said characteristic comprising at least one fluid channel calibration constant, and wherein said characteristic of said fluid channeling device stored in said memory comprises calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose.

The flow meter of Alvesteffer includes memory, (*see* Alvesteffer at Figs. 5 and 10), but the memory does not have stored therein said characteristic comprising at least one fluid channel calibration constant, and wherein said characteristic of said fluid channeling device stored in said memory comprises calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose. In stark contrast, the memory of the Alvesteffer flow meter comprises instructions which when executed operate the flow meter. *See* Alvesteffer at col. 12, lns. 17-22. Accordingly, because Alvesteffer does not disclose this claimed feature, applicants respectfully submit that claim 1, as amended, is patentable over Alvesteffer.

As the Examiner points out, Alvesteffer does mention a constant, (*see* Alvesteffer at col. 6, lns. 40-42), that may be stored as part of the instructions, but this constant is starkly different than the characteristic of said fluid channeling device stored in said memory comprising calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose recited by Claim 1 of the present application. When determining the Alvesteffer constant, the specific heat (C_P) of the fluid that is being measured is used. *See* Alvesteffer at col. 6, lns 17-27. In contrast, claim 1, as amended, recites storing characteristics of a fluid channeling device. Since the Alvesteffer constant is related to the fluid being measured, and is not in any way related to calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose, Alvesteffer also does not disclose this feature of claim 1.

Moreover, as stated above, claim 1 of the present application recites a differential pressure sensor, and recites in the claim body, a microcontroller configured to determine a differential pressure, while Alvesteffer describes a flow sensor. As is know to those of ordinary skill in the art, determinations made by a flow sensor typically do not depend on channel length (or flexible hose length) or channel characteristics (outside the section that is directly involved in the measurement). That is because such a device as described by Alvesteffer would typically give the same reading independent of the channel (or hose) length. As described in the present Specification, with a differential pressure sensor device such as that recited by claim 1, the characteristic of the channeling device, and the fluid impedance characteristics of the flexible input hose and the flexible output hose, can have an effect because they affect the impedance to the flow. As also stated in the specification, the determination of the differential pressure as claimed by claim 1 of the present application is based upon the fluid channeling device

characteristic, and is related to the total connecting impedance, including that of the flexible hoses. The microcontroller is configured to determine a differential pressure based on the level of detected fluid flow, and the characteristic, which is stored in a memory. Accordingly, applicants respectfully submit that claim 1 of the present application is patentable over Alvesteffer for these additional reasons.

Accordingly, Applicants respectfully submit that Alvesteffer does not teach, suggest, or provide motivation for all of the features of Claim 1 of the present application, and withdrawal of the rejection is requested.

Dependent claims 2-3 and 5-8 depend either directly or indirectly from claim 1, as amended. Accordingly, applicants respectfully submit that claims 2-3 and 5-8 are distinguishable from Alvesteffer, at least for the reasons stated above with respect to the rejection of claim 1.

Moreover, applicants submit that claims 2-3 and 5-8 are separately patentable over Alvesteffer for additional reasons.

With respect to claim 5, applicants respectfully submit that dependant claim 5 is further patentable over Alvesteffer for additional reasons. For example, claim 5 of the present application recites a differential pressure sensor, wherein a characteristic of a fluid channeling device comprises a first constant K_1 and a second constant K_2. As mentioned above, the flow meter of Alvesteffer does not describe fluid channel calibration constants, and thus does not describe their use with a differential pressure sensor.

Accordingly, applicants respectfully submit that, for those further reasons, Alvesteffer does not disclose all of the features of claims 2-3 and 5-8. Applicants further respectfully submit that as set forth above, the inventions recited by those claims are patentably distinguishable over

Alvesteffer, as Alvesteffer fails to teach, suggest or provide motivation for the above-discussed elements recited by those claims. *See Verdegaal*, supra. Accordingly, applicants respectfully request withdrawal of the rejection of those claims.

Fauqué

In the Office Action, claims 9-10 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,220,080 to Fauqué ("Fauqué").

Fauqué does not describe a differential pressure sensor, nor a method calibrating a differential pressure sensor. Fauqué is directed to a method and system for measuring the geometrical parameters of ultra-thin wafers. *See* Fauqué at col. 2, lns. 30-33. The measurement system comprises two measurement channels, each comprising a capacitive sensor and back pressure sensor. *See* Fauqué at Abstract. The back pressure sensor is used to calibrate the capacitive sensor for a given dielectric permittivity of a conductive target, and the capacitive sensor is used to measure the thickness of the wafer. *See* Fauqué at Abstract.

Applicants respectfully submit that claim 9, as amended, of the present application, is patentable over Fauqué, because Fauqué does not disclose each and every element of claim 9, as amended, of the present application. *See Verdegaal*, supra. Claim 9, as amended, of the present application recites, *inter alia*, 1) coupling a pressure sensor to be calibrated to the calibration system and controller, said pressure sensor comprising a fluid channeling device that comprises ~~an~~ a flexible input hose and a flexible output hose, said pressure sensor being coupled to said calibration system via said flexible input hose and said flexible output hose, 2) recording a differential pressure output signal of the pressure sensor to be calibrated indicative of its response to the pressure set within the pressure chamber, and 3) writing the constant in a memory of the pressure sensor to be calibrated, wherein a characteristic of said fluid channeling

device stored in said memory comprises calibration data related to a fluid impedance characteristic of said flexible input hose and a fluid impedance characteristic of said flexible output hose.

First, Fauqué describes a capacitive based dimensional gauge, and is not concerned with, and does not describe, the calibration of a differential pressure sensor as recited by claim 9 of the present application. Accordingly, applicants submit that it is technically improper to use Fauqué as a basis for this rejection of claim 9 of the present application.

Further, claim 9 recites coupling a pressure sensor to be calibrated to the calibration system and controller, said pressure sensor comprising a fluid channeling device that comprises a flexible input hose and a flexible output hose, said pressure sensor being coupled to said calibration system via said flexible input hose and said flexible output hose. In stark contrast, Fauqué does not describe flexible hoses as part of a measuring system. *See* Fauqué at Figs. 1 and 2. Therefore Fauqué also does not describe this feature as recited in claim 9.

Further, claim 9, as amended, recites, in the <u>body</u> of the claim, recording a differential pressure output signal of the pressure sensor to be calibrated indicative of its response to the pressure set within the pressure chamber. In contrast, as described above, Fauqué describes a capacitive based dimensional gauge, and is not concerned with, and does not describe, the recording of a differential pressure signal as recited by claim 9 of the present application.

In addition, claim 9 also recites writing the constant in a memory of the pressure sensor to be calibrated, wherein a characteristic of said fluid channeling device stored in said memory comprises calibration data related to a fluid impedance characteristic of said flexible input hose and a fluid impedance characteristic of said flexible output hose. Because the measuring system of Fauqué does not include flexible hoses, any memory that is a part of the Fauqué system cannot

and does not include calibration data for any flexible hoses. For this additional reason, Fauqué does not disclose all the features of claim 9.

Dependent claim 10 depends directly from claim 9, as amended. Accordingly, applicants respectfully submit that claim 10 is distinguishable from Fauqué, at least for the reasons stated above with respect to the rejection of claim 9.

Accordingly, applicants respectfully submit that Fauqué does not disclose all of the features of claims 9-10. Applicants further respectfully submit that as set forth above, the inventions recited by those claims are patentably distinguishable over Fauqué , as Fauqué fails to teach or suggest the above-discussed elements recited by those claims. *See Verdegaal*, supra. Accordingly, applicants respectfully request withdrawal of the rejection of those claims.

Nishimura

In the Office Action, claims 11-27 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,264,961 to Nishimura ("Nishimura").

Nishimura does not describe the use of a differential pressure sensor in an enclosure for the control of an air flow. Nishimura is directed to an apparatus for measuring the flow rate of suction air in an internal combustion engine. *See*, e.g., Nishimura at abstract. The flow rate, along with other measurements, are processed by a control unit to create control signals for a fuel injector and an ignition coil. *See* Nishimura at col. 4, lns. 25-38.

Applicants respectfully submit that, claim 11, as amended, of the present application is patentable over Nishimura because Nishimura does not disclose each and every element of claim 11, as amended, of the present application. *See Verdegaal,* supra.

Claim 11, as amended, of the present application recites, *inter alia*, an air channeling device having an air channel defined therethrough and a air flow detector located in said air

channel, said air channeling device further having a flexible input hose, a flexible output hose, and a container having an input aperture to which said flexible input hose is coupled, and an output aperture to which said flexible output hose is coupled, said first differential pressure sensor being coupled to said supply air system via said flexible input hose and said flexible output hose,

In contrast, Nishimura does not describe an air flow detector located in said air channel, said air channeling device further having a flexible input hose, a flexible output hose, and a container having an input aperture to which said flexible input hose is coupled, and an output aperture to which said flexible output hose is coupled, said first differential pressure sensor being coupled to said supply air system via said flexible input hose and said flexible output hose.

Nishimura does not describe even one of these elements, let alone the inventive combination of all of these elements. The Examiner posits that Fig. 5 of Nishimura shows an input hose and an output hose, but applicants respectfully disagree. Fig. 5 illustrates a hot wire and a differential pressure sensor "disposed in ... bypass passage[s] formed in the main venture chamber body." *See* Nishimura at col. 8, ln. 64 to col. 9, ln. In Nishimura, the bypass passages are formed in the main body, and thus no hoses are taught, described or suggested. In addition, the description of the first flow meter embodiment described in Nishimura does not mention hoses, let alone flexible hoses. *See* Nishimura at col. 3, ln. 19-62. Additionally, since the flow meter of Nishimura does not include flexible hoses, the flow meter of Nishimura cannot and does not include any input aperture for coupling a flexible input hose, an output aperture for coupling a flexible output hose, or memory comprising calibration data for the flexible input and output hoses.

Claim 11, as amended, of the present application further recites memory having stored therein a characteristic of said air channeling device, said characteristic comprising at least one air channel calibration constant, and wherein said characteristic of said air channeling device stored in said memory comprises calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose, and

The flow meter of Nishimura includes memory, (*see* Nishimura at Fig. 2), nos. 207, 209, more specifically RAM and ROM, but the memory does not have stored therein a characteristic of an air channeling device, the characteristic comprising at least one air channel calibration constant, wherein said characteristic of said air channeling device stored in said memory comprises calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose. Instead, the RAM of the Nishimura flow meter comprises a calibration coefficient, voltage, differential pressure and temperature readings, (*see* Nishimura at col. 4, ln. 38-40 and col. 6 lns. 55-59), while the ROM of the Nishimura flow meter comprises control programs and fixed data comprising a predetermined reference pressure. *See* Nishimura at col. 6, lns. 29-30. Since Nishimura does not disclose memory having stored therein a characteristic of an air channeling device, the characteristic comprising at least one air channel calibration constant, wherein said characteristic of said air channeling device stored in said memory comprises calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose, Nishimura does not disclose all the features of claim 1.

Furthermore, the calibration coefficient stored in the RAM of the Nishimura flow meter is starkly different from the claims as an air channel calibration constant. In Nishimura, when determining the calibration coefficient, K, the surface area of the of a hot wire (S) is included in the equation. *See* Nishimura at col. 4, ln. 54 to col. 5 ln. 8. In contrast, claim 11, as amended,

recites storing characteristics of an air channeling device. Since the coefficient described in Nishimura is related to the surface area of the of a hot wire, and <u>not</u> related to an air channeling device, nor the fluid impedance characteristics for said flexible input hose and said flexible output hose, Nishimura does not disclose all the features of claim 11.

Additionally, claim 11 recites a first differential pressure sensor calculating a differential pressure and controlling said supply air system to maintain a predetermined air flow in the enclosure. The Examiner posits that the control unit of Nishimura discloses this element of claim 11, but applicants respectfully disagree. In Nishimura, flow rate is measured to create control signals for a fuel injector and an ignition coil. *See* Nishimura at col. 4, lns. 25-38. Nishimura does not describe the use of a differential pressure sensor to calculate a differential pressure nor maintain a predetermined air flow in an enclosure, as recited by claim 11 of the present application. The air flow into an internal combustion engine is regulated by the amount a driver presses the accelerator. Therefore, Nishimura does not disclose a first differential pressure sensor calculating a differential pressure and controlling an supply air system to maintain a predetermined air flow in an enclosure, as recited in claim 11.

Dependent claims 12, 13, 15-22 and 24-27 depend either directly or indirectly from claim 11, as amended. Accordingly, applicants respectfully submit that claims 12, 13, 15-22 and 24-27 are distinguishable from Nishimura, at least for the reasons stated above with respect to the rejection of claim 11.

Moreover, applicants respectfully submit that claims 12, 13, 15-22 and 24-27 are also patentable over Nishimura for addition reasons. With respect to claim 15, applicants respectfully submit that dependant claim 15 is further patentable over Nishimura because Nishimura does not disclose additional elements recited in claim 15 of the present application.

See Verdegaal, supra. Claim 15 of the present application recites, a differential pressure sensor, wherein a characteristic of a fluid channeling device comprises a first constant K_1 and a second constant K_2. As mentioned above, Nishimura does not describe a differential pressure sensor as recited by claim 15. Further, the flow meter of Nishimura does not describe, suggest or provide motivation for fluid channel calibration constants. Accordingly, Nishimura does not disclose all of the elements of claim 15.

Applicants respectfully submit that dependant claim 19 is also patentable over Nishimura because Nishimura does not disclose additional elements recited in claim 19 of the present application. *See Verdegaal*, supra. Claim 19 of the present application recites, *inter alia*, an exhaust air system coupled to a chamber for providing air flow out of the chamber. Nishimura is directed to use with an internal combustion engine. Therefore Fig. 1 illustrates an air intake system. As illustrated in figure 1 after the inputted air is mixed with fuel, the air/fuel mixture is sent to the engine. Importantly, Nishimura does not disclose an exhaust air system coupled to the chamber for providing air flow out of a chamber, as recited in claim 19.

Dependent claims 20-22 and 24-27 depend either directly or indirectly from claim 19. Accordingly, applicants respectfully submit that claims 20-22 and 24-27 are distinguishable from Nishimura, at least for the additional reasons stated above with respect to the rejection of claim 19.

Applicants respectfully submit that dependant claim 20 is patentable over Nishimura because Nishimura does not disclose additional elements recited in claim 20 of the present application. *See Verdegaal*, supra. Claim 20 of the present application recites, 1) an air channeling device having an air channel defined therethrough and a air flow detector located in said air channel, said air channeling device further having a flexible input hose, a flexible output hose, and a

container having an input aperture to which said flexible input hose is coupled, and an output aperture to which said flexible output hose is coupled, said second differential pressure sensor being coupled to said supply air system via said flexible input hose and said flexible output hose, 2) memory having stored therein a characteristic of said air channeling device, said characteristic comprising at least one air channel calibration constant, and wherein said characteristic of said air channeling device stored in said memory comprises calibration data related to the fluid impedance characteristics for said flexible input hose and said flexible output hose, and 3) said second differential pressure sensor calculating a differential pressure and controlling said exhaust air system to maintain a predetermined air flow in the enclosure.

As described above with respect to the rejections to claim 11, Nishimura does not describe any of these features, and certainly does not describe a second pressure sensor having these features. Accordingly, for these additional reasons, applicants submit that Nishimura does not describe all of the features of claim 20, as amended, of the present application.

Dependent claims 21-22 and 24-27 depend either directly or indirectly from claim 20. Accordingly, applicants respectfully submit that claims 21-22 and 24-27 are distinguishable from Nishimura, at least for the additional reason stated above with respect to the rejection of claim 20.

Accordingly, applicants respectfully submit that Nishimura does not disclose all of the features of claims 11-13, 15-22 and 24-27. Applicants further respectfully submit that as set forth above, the inventions recited by those claims are patentably distinguishable over Nishimura , as Nishimura fails to teach or suggest or provide motivation for the above-discussed elements recited by those claims. Accordingly, applicants respectfully request withdrawal of the rejection of those claims. Early notification of allowance is respectfully requested.

Conclusion

Accordingly, applicants submit that all of the claims in the application (i.e., 1-3, 5-13, 15-22 and 24-27) are in condition for allowance. Applicants respectfully request entry of this Amendment, and early and favorable action in the above-identified application.

Any fees or charges required in connection with the present application may be charged to Deposit Account No. 19-4709.

Respectfully submitted,

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